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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,429	02/05/2002	Frederik Visser	NL010061	7862

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PHILIPS ELECTRONICS NORTH AMERICAN CORP
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EXAMINER

FETZNER, TIFFANY A

ART UNIT	PAPER NUMBER
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2859

DATE MAILED: 05/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
10/067,429

Applicant(s)
Visser et al.,

Examiner
Tiffany Fetzner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Feb 5, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Feb 5, 2002 is/are a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 4, 7, 8 6) ☐ Other:

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DETAILED ACTION

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. **Figure 1** should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. Applicant is required to submit a proposed drawing correction in response to this Office Action. Any proposal by the applicant for amendment of the drawings to cure defects **must consist of two parts:**

A. A separate letter to the Draftsman in accordance with M.P.E.P. (608.02(r)); and

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- B. A print or pen-and-ink sketch showing changes in red ink in accordance with M.P.E.P. (608.02(v)).

IMPORTANT NOTE: The filing of new formal drawings to correct the noted defect may be deferred until the application is allowed by the examiner, but the print or pen-and-ink sketch with proposed corrections shown in red ink is required in response to this Office Action, and *may not be deferred*.

Specification

5. The disclosure is objected to because of the following informalities:

A) The reference to Figure 10 in applicant's original disclosure on page 7 line 3, should be removed and a reference to figure 8 inserted, because the figure being referred to is Figure 8. Additionally the examiner notes that there is no Figure 10 in the instant application as originally filed. Appropriate correction is required.

B) The phrase "in dependence on" at each place where it occurs in the specification is confusing. The examiner cannot determine if applicant is referring to an independency where something is independent of something else, or a dependency based upon, or "on", something else.

The phrase "in dependence on" should be replaced at each location where it occurs in the specification, with either "independent of" or "dependent upon" or "depending on". Appropriate correction is required.

Claim Objections

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6. **Claims 1**, and **7-9** are objected to because of the following informalities: these claims contain the phrase “in dependence on” which is unclear to the examiner in both the disclosure and claims, as mentioned in paragraph 5b above. The phrase “in dependence on” should be replaced in each claim with either “independent of” or “dependent upon” or “depending on”. Appropriate correction is required.

7. **Claims 2-6** are objected to because they depend from **claim 1**.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. **Claims 1, 7, 9** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Vij et al.**, US patent 5,370,118.

10. With respect to **Claim 1**, and corresponding method **claim 9**, **Vij et al.**, teaches and shows “A magnetic resonance imaging apparatus/method comprising: an RF coil system comprising at least two sets of at least two RF coils for detecting RF signals from a region of interest,” [See abstract, Figure 5, col. 4 lines 7-25] “at least two receiver channels for receiving

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and processing the detected RF signals,” [See Figure 5, which suggests at least four channels (i.e. 62, 70; 66, 68) “and a control unit for selecting and/or combining the RF signals of at least two RF coils **in dependence on** the imaging parameters and for applying the selected and/or the combined RF signals to separate receiver channels.” [See Figure 5 combining networks 82, 86, and hybrid combiner 90, col. 6 line 62 through col. 8 line 63.]

11. With respect to **Claim 7, Vij et al.**, teaches and shows “said control unit is provided to select and/or combine the RF signals of at least two RF coils.” [See Figure 5 combining networks 82, 86, and hybrid combiner 90, col. 6 line 62 through col. 8 line 63.] “is provided to select and/or combine the RF signals of at least two RF coils **in dependence on** the phase encoding direction.”

12. **Claims 1-7, 9** are rejected under **35 U.S.C. 102(e)** as being anticipated by **Burl et al.**, US patent 6,377,044.

13. With respect to **Claim 1, Burl et al.**, teaches and shows “A magnetic resonance imaging apparatus comprising: an RF coil system comprising at least two sets of at least two RF coils for detecting RF signals from a region of interest,” [See Figure 4 where: coils 100₁, 100₂, 100₃, 100₄, comprise a first set of four coils; coils 102₁, 102₂, 102₃, 102₄, comprise a second set of four coils; or coils (100₁, and 102₁), (100₂ and 102₂), (100₃, and 102₃), and (100₄, and 102₄) comprise four sets of two coils as taught in col. 4 lines 24-49] **Burl et al.**, also teaches and shows “at least two receiver channels for receiving and processing the detected RF signals,” [See Figures 1 through 4] “and a control unit for selecting and/or combining the RF signals of at least two RF coils **in dependence on** the imaging parameters and for applying the selected and/or the combined RF

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signals to separate receiver channels.” [See the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49]

14. With respect to **Claim 2, Burl et al.**, teaches and shows “said control unit is provided to combine the RF signals of several groups of at least two RF coils (i.e coils 100₁, 100₂, 100₃, 100₄, comprise a first set of four coils; coils 102₁, 102₂, 102₃, 102₄, comprise a second set of four coils; and coils (100₁, and 102₁), (100₂ and 102₂), (100₃, and 102₃), and (100₄, and 102₄) comprise four sets of two coils as taught in col. 5 lines 24-49), “into a separate receiver channel.” [See the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49]

15. With respect to **Claim 3, Burl et al.**, teaches and shows “said RF coil system (9, 10, 11, 12) comprises two sets of four RF coils.” [See Figure 4, coils 100₁, 100₂, 100₃, 100₄, comprise a first set of four coils; coils 102₁, 102₂, 102₃, 102₄, comprise a second set of four coils; and coils (100₁, and 102₁), (100₂ and 102₂), (100₃, and 102₃), and (100₄, and 102₄) comprise four sets of two coils as taught in col. 5 lines 24-49),

16. With respect to **Claim 4, Burl et al.**, teaches and shows “a birdcage head coil arrangement.” [See col. 3 lines 30 through col. 4 line 17; Figure 1 component 28; col. 1 lines 33-47; and col. 5 lines 41-42 which teaches that the head piece coils, (i.e. the birdcage style head coils shown in Figure 1), can be conveyed to separate receiver channels.]

17. With respect to **Claim 5, Burl et al.**, teaches and shows “said control unit is provided to combine the RF signals of RF coils arranged on opposite sides of the head.” [See Figure 1 the sequence control processor component 50, and teachings of col. 3 line 30 through col. 5 line 49]

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18. With respect to **Claim 6, Burl et al.**, teaches and shows “said control unit is provided to combine the RF signals of neighboring RF coils.”[See Figure 1 the sequence control processor component 50, and teachings of col. 3 line 30 through col. 5 line 49, especially col. 5 lines 23-42]

19. With respect to **Claim 7, Burl et al.**, teaches and shows “said control unit is provided to select and/or combine the RF signals of at least two RF coils **in dependence on** the phase encoding direction.” [See Figures 1, 2, 3, the sequence control processor component 50, and teachings of col. 3 line 30 through col. 5 line 49]

20. With respect to **Claim 9, Burl et al.**, teaches and shows “A magnetic resonance imaging method, comprising the steps of: detecting RF signals from a region of interest while using an RF coil system comprising at least two sets of at least two RF coils”, [See Figure 4 where: coils 100₁, 100₂, 100₃, 100₄, comprise a first set of four coils; coils 102₁, 102₂, 102₃, 102₄, comprise a second set of four coils; or coils (100₁, and 102₁), (100₂, and 102₂), (100₃, and 102₃), and (100₄, and 102₄) comprise four sets of two coils as taught in col. 4 lines 24-49] “receiving and processing the detected RF signals while using at least two receiver channels, [See Figures 1 through 4; col. 4 line 18 through col. 5 line 49] “and selecting and/or combining the RF signals of at least two RF coils **in dependence on** the imaging parameters and applying the selected and/or the combined RF signals to separate receiver channels.” [See the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49]

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

22. **Claim 8** is rejected under **35 U.S.C. 103(a)** as being unpatentable over **Burl et al.**, US patent 6,377,044 as applied to **claims 1-7, and 9** above, and further in view of **Pruessmann et al.**, article "SENSE: Sensitivity encoding for Fast MRI" Magnetic Resonance in Medicine 42: pages 952-962 1999.

23. With respect to **Claim 8**, **Burl et al.**, teaches and shows "said control unit is provided to select and/or combine the RF signals of at least two RF coils" [See Figures 1 through 4; col. 4 line 18 through col. 5 line 49].

24. **Burl et al.**, lacks directly teaching that the "selection and/or combination of the RF signals of at least two RF coils is **in dependence on** the desired SENSE reduction direction." However, SENSE, a conventional MRI multi-coil encoding procedure developed originally by **Pruessmann et al.**, in 1999, is usable with FFE (i.e. fast field echo), TSE (i.e. turbo spin-echo), and half-Fourier EPI (i.e. echo-planar imaging) procedures, [See **Pruessmann et al.**, page 958 col. 2 discussion paragraph] and **Burl et al.**, teaches the use of numerous procedures with the **Burl et al.**, device including: "any of a plurality of magnetic resonance imaging and spectroscopy sequences, such as echo-planar imaging, echo-volume imaging, gradient and spin-echo imaging, fast spin echo imaging and the like." [See **Burl et al.**, col. 4 lines 18-23] Therefore, It would have been obvious to one of ordinary skill in the art, at the time that the invention was made to modify the teaching of **Burl et al.**, to include SENSE MRI techniques because the type of imaging sequences for which SENSE is known to be usable, are producible by **Burl et al.**, apparatus.

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25. Additionally, **Pruessmann et al.**, teaches and suggests that in conventional SENSE MRI methodology the reduction factor is bound by the number of coils used. [See page 953 col. 2 the first full paragraph], and that the geometry factor, (i.e. the arrangement of the coils around a patient, such as the arrangements shown on page 957 in Figure 3 of col. 1, and the phantom experiments section of page 957) of SENSE methodology allows the coil configuration to be freely optimized with respect to SNR, independently of coil and slice geometry. [See page 960 col. 1 paragraph 1 and page 960 col. 1 conclusion paragraph 1.] This teaching suggests that the use of a SENSE method results in an inherent reduction factor, related to the number of coils used or selected, and that the actual geometrical positioning of the coils is important, and also suggests applicant's limitation that the "selection and/or combination of the RF signals of at least two RF coils is **in dependence on** the desired SENSE reduction direction." [See **Pruessmann et al.**, RESULTS page 957 col. 1 through page 958 col. 2].

26. It would have been obvious to one of ordinary skill in the art, at the time that the invention was made that the geometrical arrangement of coils in the **Burl et al.**, apparatus would also have a "selection and/or combination of the RF signals of at least two RF coils is **in dependence on** the desired SENSE reduction direction", when implemented in a SENSE procedure, because the coil arrangements taught in col. 5 lines 23-49 of **Burl et al.**, suggest geometrical arrangements of two, four, or more combined coils based on the geometrical anatomy to be imaged, therefore if the **Burl et al.**, reference was modified to include the teachings of **Pruessmann et al.**, SENSE methodology the limitation of combining signals based on the desired SENSE reduction, for a specific portion of patient anatomy would fall within the scope of the **Burl et al.**, reference.

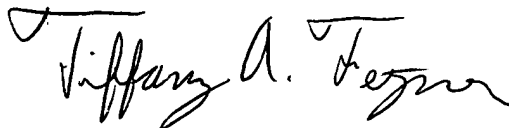
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Conclusion

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Tiffany Fetzner** whose telephone number is **(703) 305-0430**. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

28. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Diego Gutierrez**, can be reached on **(703) 308-3875**. The fax phone number for the organization where this application or proceeding is assigned is **(703)305-3432**.

29. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is **(703) 305-0956**.



TAF

April 30, 2003



**Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800**